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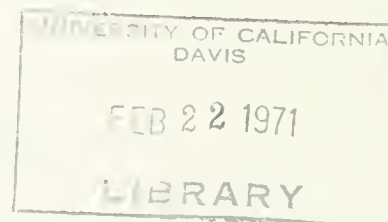
Department of Water Resources

BULLETIN No. 105-3

NORTH COASTAL AREA ACTION PROGRAM

A Study of the Smith River Basin and Plain

DECEMBER 1970



NORMAN B. LIVERMORE, JR.
Secretary for Resources
The Resources Agency

RONALD REAGAN
Governor
State of California

WILLIAM R. GIANELLI
Director
Department of Water Resources



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FOREWORD

Bulletin No. 105-3 reports on a 1-1/2-year reconnaissance-level study of water problems and potential water developments within the Smith River Basin and Plain area. This bulletin is the third in a series of reports by the Department of Water Resources under the continuing North Coastal Area Action Program. This program was initiated by the Legislature in 1966 to study local water problems of communities in the North Coast area. Study under this program is oriented toward defining local water problems, assessing their relative severity, and making recommendations which will contribute to the solution of these problems and facilitate orderly water development within the study area.

Water-related problems in the Smith River study area include flooding, the need for distribution of available water supplies to areas outside of Crescent City, ground water contamination, and low well yields. Ample water supplies are available to meet the future needs of the Smith River Basin and Plain without disruption of the natural flows of the Smith River. Specific recommendations are made regarding the Bertsch Tract, the Smith River, Lakes Earl and Talawa, water well construction and sealing standards, and floodplain management.

This study was coordinated with local agencies involved in water development. Much information was provided by the Del Norte County Flood Control District and the Crescent City Municipal Water District.

The Department and the California Water Commission will hold a public hearing on the findings of this report within a few months after publication to receive the comments of all parties interested in the investigation. Following the public hearing, the Department will publish a summary of the hearing comments which, together with the main bulletin, will constitute the final edition of Bulletin No. 105-3.

William R. Gianelli

William R. Gianelli, Director
Department of Water Resources
The Resources Agency
State of California
October 14, 1970



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The Resources Agency

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ABSTRACT

The 770-square-mile Smith River Basin and Plain in the northwestern corner of California has adequate water supplies overall, but a problem exists in distributing the water to the areas of use. The present water needs are now met, and can probably continue to be met, from ground water pumping and direct diversion of unregulated streamflow.

The Bertsch Tract and surrounding area near Crescent City has experienced serious ground water problems such as low well yields, high iron content, bad taste, and sewage contamination. Existing and proposed subdivision development around Lakes Earl and Talawa could eventually pose a water quality threat to the lakes and ground water if individual septic systems are used for sewage disposal. The Smith River Basin, including Lakes Earl and Talawa, is subject to periodic flooding which does considerable damage to roads, bridges, and agricultural land. Urban encroachment onto floodplain lands would increase the damages of these floods tremendously.

A large part of the study area's projected water demand will come from areas near Crescent City that could be served by the Crescent City system. The Department of Water Resources recommends that Del Norte County encourage the extension of Crescent City water service to such areas, including the Bertsch Tract. The Department further recommends that the water in Lakes Earl and Talawa be tested periodically to determine if pollution from septic systems is reaching the lakes, that a floodplain management program be developed for the Smith River, that adequate water well construction and sealing standards be adopted and enforced, and that all levels of government make a concerted effort to preserve the outstanding natural beauty and aesthetic character of the Smith River Basin.



SMITH RIVER NEAR HIOUCHI

CHAPTER 1. INTRODUCTION

During the first extraordinary session of 1966, the California Legislature adopted Assembly Concurrent Resolution No. 27. This resolution requested that the Department of Water Resources initiate an Action Program to investigate local water problems in the North Coast area, primarily on the Smith, Mad, Van Duzen, and South Fork Eel Rivers. In response to this resolution the Department has published two previous reports.

The first, Bulletin No. 105-1, "Developing the North Coast, An Action Program", served as a general introduction and outline of a systematic work program for studying local water problems in the North Coastal area. Bulletin No. 105-2, "North Coastal Area Action Program, A Study of the McKinleyville-Trinidad Area", focused attention on the water problems of the coastal communities immediately north of Arcata in Humboldt County. This report recommended the extension of a water line from the Humboldt Bay Municipal Water District into the McKinleyville-Trinidad service area.

Bulletin No. 105-3 presents the results of a 1-1/2-year reconnaissance-level study of water problems and potential water developments within the Smith River Basin and Plain area. The study area is located in the extreme northwestern corner of California. It includes the Smith River Basin and the Smith River Plain which together encompass approximately 770 square miles. An area of 680 square miles of the study area lies in Del Norte County and the remaining 90 square miles extends into Southern Oregon where the North Fork Smith River begins. Most of the effort during this study was concentrated in the coastal plain area where the majority of the people live.

This investigation was conducted to define local water problems, to assess their relative severity, and to make recommendations which could contribute to orderly water development within the study area. These studies lacked the scope to identify specific solutions to all water problems encountered during the course of this investigation. Our evaluations were conducted at a preliminary level.

This report appraises available water supplies in the Smith River Basin and Crescent City Plain area, forecasts future water demands in that area, identifies specific water-related problems, evaluates physical plans to solve those problems, and recommends a course of action to effectively use the water resources of the area.

Specific problems studied include: (1) the need for future water supplies throughout the Crescent City Plain, (2) flooding along the lower Smith River, and (3) the many water-related problems associated with Lakes Earl and Talawa.

Potential future developments discussed in this report include: (1) direct diversion of unregulated flows from the Smith River,

(2) construction of a dam and reservoir on Rowdy Creek, (3) increased ground water pumping on the Smith River Plain, and (4) adoption of floodplain management procedures.

Chapter 2 of this report presents a detailed description of the study area. Chapters 3, 4, and 5 discuss existing and potential water problems in the study area, existing and potential future water developments in the study area, and the general findings of this study.

CHAPTER 2. THE STUDY AREA

The area of investigation for this report is shown in Figure 1, page 4. The study was concentrated on the coastal plain where most of the population is located (see Figure 2 on page 12). This chapter presents a detailed description of the area and its water resources.

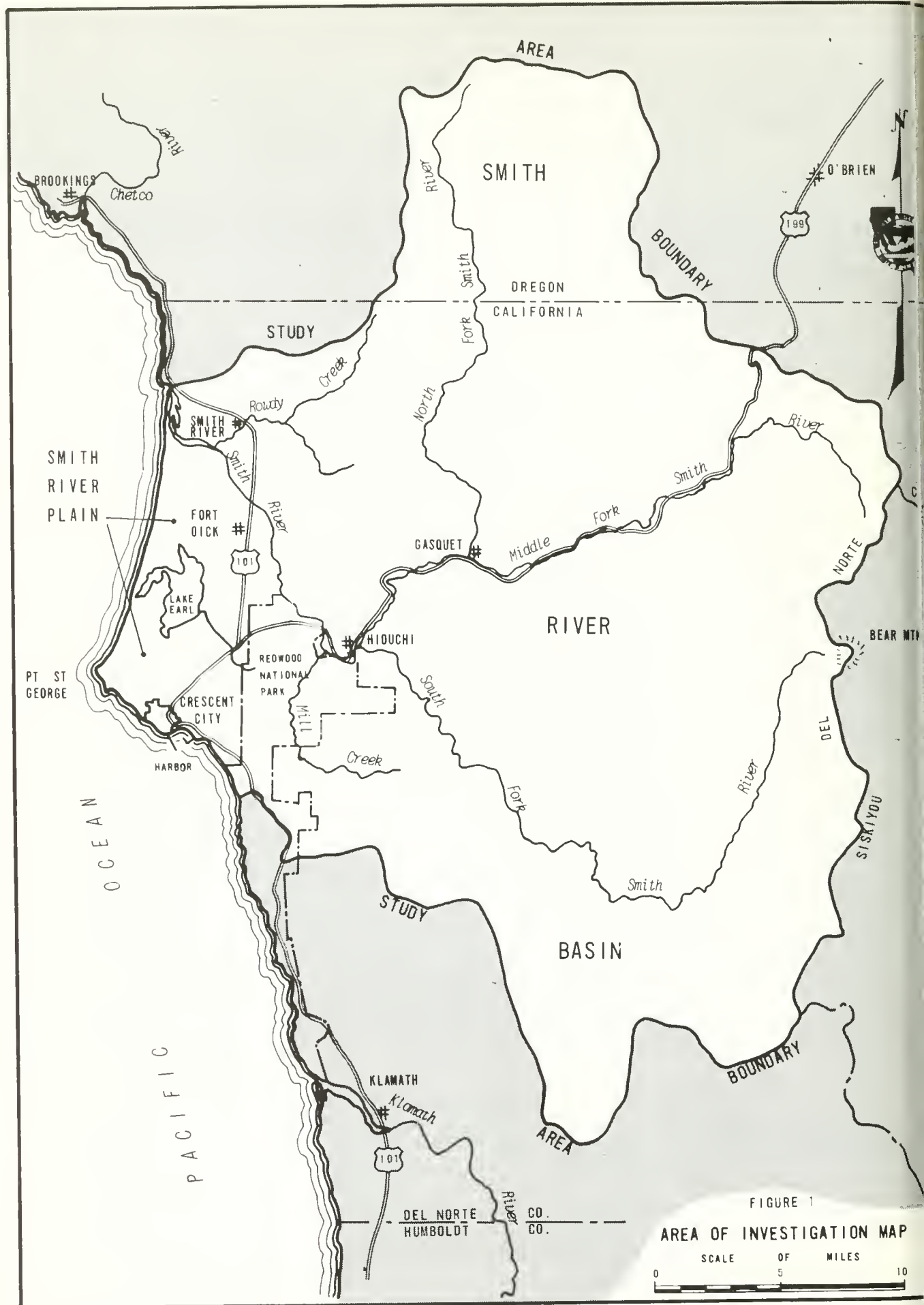
Natural Features

The predominant feature of the study area is the Smith River itself. This stream, which is known for its exceptional clarity and high water quality, winds its way through one of the most scenic and relatively undeveloped basins in California. Sizable runs of salmon, steelhead, and cutthroat trout spawn in the Smith River.

The Smith River Plain is an approximately rectangular marine terrace with average dimensions of 4 by 15 miles, rising gradually from the Pacific Ocean and ending abruptly at the first low range of eastern hills. From this point eastward, the Smith River Basin is a series of rugged mountains and steep ravines leveled in a few locations by small streamside flats. Mountains comprise about 90 percent of the total land area of the Smith River Basin and Plain. Elevations exceeding 5,000 feet are common along the eastern basin boundary. Bear Mountain is the highest, reaching an elevation of 6,424 feet. Most of the area along the Siskiyou Mountain divide is inaccessible except by trails.

The Smith River Plain area has some unique and interesting features. At the north end lies the Smith River Delta, with rich alluvial soils and numerous sloughs radiating from the river's mouth. Occasionally, during high flows, the Smith River will overtop the south bank and flood Talawa Slough, pouring water into Lake Earl. This lake is a shallow, brackish body of water which occupies 2,200 acres near the central portion of the plain. In the past, this lake was part of the mouth of the Smith River. Now it is landlocked by an ocean sandbar and subject to flooding which nearly doubles its normal area. Sand dunes to the west of Lake Earl extend from Point St. George to the mouth of the Smith River. A natural crescent-shaped harbor, after which Crescent City was named, is located at the south end of the plain. Giant redwoods once covered a large portion of the eastern plain, as evidenced by the many great stumps dotting this area.

The climate of the Smith River Basin is greatly influenced by its proximity to the ocean. This basin is one of the wettest areas in California, with annual rainfall varying from 60 inches near Crescent City to 125 inches along several peaks in the interior basin. Ninety percent of the precipitation occurs from October through April; however, a summer dampness is maintained along the coastal areas by frequent fog and low clouds. Winter snowfall occurs at higher elevations within the drainage. Average daily temperatures in the study area are in the low to mid 50s.



Temperature extremes vary considerably from the coastal region to the high inland areas. Crescent City has experienced extremes of 92 degrees high and 24 degrees low. Inland regions have experienced highs of 105 degrees and lows near 0 degrees.

The geologic features of the study area are varied but fall under the general categories of mountainous and marine plain. The Smith River Plain can be divided into five physiographic areas -- marine terrace, river terrace, floodplain, sand dune, and alluvial fan. A detailed description of Del Norte County's regional geology can be found in Department of Water Resources' Bulletin No. 74-3, "Well Water Standards, Del Norte County".

Development

The Smith River is named for Jedediah Smith, an explorer and trapper, who is thought to have been the first white man to travel through what is now Del Norte County. Early development at Crescent City was associated with gold mining during the 1850s. Although not located in the gold country proper, Crescent City, because of its protected bay, became a trading center for miners operating in the interior. Crescent City was incorporated in 1854 and had a population of nearly 1,000.

Following the gold rush, many years of limited growth and low economic activity ensued. Agricultural products and timber were the two major sources of income within Del Norte County. Today, timber covers nearly 60 percent of the land in the county and is directly responsible for more than a third of the jobs. The present-day pattern of the lumber industry began to develop about 1950 when the production of veneer, plywood, and remanufactured lumber commenced. Today many of the wood products leaving the county are in some form other than logs. The total timber production has varied from 142 million board feet (mbf) in 1950 to a peak of approximately 350 mbf in 1964. The 1968 timber production in Del Norte County was 302 mbf. The lumber industry will continue to offer a good employment foundation, but it is not expected to stimulate significant future growth in the county.

Agriculture is the second largest industry in Del Norte County. The growth of livestock pasture is the most predominant use of agricultural land in the northern third of the Smith River Plain. The Easter lily bulb has become a profitable crop and in 1969 contributed approximately \$1.4 million to the total county farm income of approximately \$4.3 million. Other important agricultural products are dairy products, hay, daffodils and azaleas, chickens, sheep, and hogs.

Commercial ocean fishing contributes more than \$1 million annually to local income. The recent construction of two fish processing plants in Crescent City has expanded the number of jobs available and created a new source of income.

Most of the development within Del Norte County has occurred on the Smith River Plain. Crescent City, with a population of approximately 3,500, is the only incorporated city within the county. Greater Crescent City, which includes an area within a 3-mile radius of the civic center, has a population more than double that within the city limits. Some of the more prominent developments within this area are the recently completed civic center and shopping mall area, a large indoor swimming pool and beach front public park, the community-built public dock facilities, and the county airport near Point St. George. North of Crescent City are two smaller communities, Fort Dick and Smith River, with a combined population of approximately 4,000. Most of the farms and dairy herds are located within the region comprising the upper one-third of the plain area.

U. S. Highway 101 runs the length of the Smith Plain and connects it with coastal cities throughout California and Oregon. Existing and planned improvements on Route 101 will result in a continuous four-lane divided freeway between San Francisco and Crescent City in the near future. U. S. Highway 199 connects Crescent City with Grants Pass, Oregon, and generally follows the Middle Fork Smith River to the Siskiyou Divide. There are few lateral roads into the upper reaches of the mountainous Smith River Basin; however, the increase of logging operations on U. S. Forest Service land is expected to increase the construction of secondary road systems.

Rail service does not extend to Del Norte County. The nearest railheads are located at Arcata, 75 miles distant, and Grants Pass, 87 miles distant. Air passenger and freight service is available at the county airport near Point St. George. The Citizens Dock located south of Crescent City has facilities to serve a local fishing fleet and shallow-draft lumber transport vessels.

The small inland communities of Hiouchi and Gasquet are located on flats adjacent to the main and middle forks of the Smith River. These are resort-oriented towns that serve the needs of summer recreationists and fall fishermen.

Recreation

Until the 1950s, recreation played a small role in the economy of Del Norte County. However, attendance at state parks in the county has been increasing about 7 percent per year since 1950. Attendance at Jedediah Smith, Prairie Creek, and Del Norte State Parks in 1968-69 was approximately 463,000 visitors. The recent construction of the 142-unit Mill Creek Campground and the formation of Redwood National Park should contribute significantly to the future recreation growth rate. Recreational use of Del Norte County is seen as a major growth industry which in future years will rival timber as the greatest producer of income to the county.

The Smith River Basin and vicinity offers a unique, yet well rounded, outdoor recreational experience. The most famous natural resource

of this area is the magnificent coastal redwoods which grow to maturity only in the fog belts of Northwestern California. Much of the remaining virgin redwoods in the Smith River Basin lie within the boundary of the newly formed Redwood National Park. This park, in part, will encompass the two state parks in Del Norte County, Jedediah Smith and Del Norte Coast Redwoods. Recreational activities, such as clam digging, surf fishing, and sightseeing, occur along the coast. The rugged, upper basin mountains are habitat for black bear and deer which provide good hunting. Lake Earl is used as a resting area by migrating waterfowl following the Pacific Flyway, and hunting of these birds is a popular sport along the western shore of the lake. Upland game birds, such as quail, pigeons, and grouse, are also hunted in the basin.

For those people who wish to escape as completely as possible into the forest, there are numerous rustic U. S. Forest Service camps, as well as a wilderness-like region along the Siskiyou Divide between the Smith and Klamath Rivers. Increasing numbers of hikers and backpackers travel through and camp in this remote virgin area each year. Swimming is a popular sport in the calm pools of the Smith River below the confluence of the South and Main Forks. Other recreational activities available are horseback riding, deep sea fishing, golfing, and the viewing of historical monuments.

The Smith River is known for its exceptional beauty and its ability to clear rapidly after winter storms. Many fishermen drive great distances to fish in the Smith River when other North Coast streams are still turbid. The North and South Forks of the Smith River are still in a relatively wild state with little or no development having taken place. U. S. Highway 199 parallels the Middle Fork, and the community of Gasquet is located at its confluence with the North Fork Smith River. Still, this region has remained relatively undeveloped and has retained much of its wilderness characteristic.

Public interest in the relationship between man's activities and their effect upon his surroundings is increasing. New state and federal legislation designed to protect the environment is being planned and passed almost daily. Certainly, the water quality of the Smith River should be stringently protected and, even beyond this, serious consideration should be given to developing a balanced land use plan which would preserve large portions of the Smith River Basin in a natural state. The county of Del Norte should take the lead in developing such a plan.

Water Supply

The sources of water in the study area are natural surface flow and ground water. A portion of this supply is used in the Smith River Plain, but most of it drains from the area through the Smith River into the Pacific Ocean.

Average precipitation in the Smith River Basin is about 108 inches annually. The geographical distribution of the average basin rainfall is most directly related to elevation. On the lower Smith River Plain, the

average rainfall varies from 60 to 80 inches. Higher in the headwaters of the basin, rainfall averages run as high as 125 inches per year at Ship and High Plateau Mountains. Seasonal distribution of rainfall within the Smith River Basin is one of the least variable in California. Rainfall during extremely wet or dry years varies from 180 to 45 percent of the "normal" or average annual rainfall.

Snowfall varies from a negligible amount along the coast to more than 125 inches in the interior mountainous region. Most of the snow melts rapidly after falling and little remains after the beginning of warm spring weather.

Extremely heavy rainfall does occur periodically in the Smith River Basin. In December 1964 the meeting of a warm mass of moist tropical air with a flow of cold air from Alaska produced a rainfall total of 34 inches in nine days at the Idlewild Highway Maintenance Station.

The Smith River Basin is the greatest water-producing drainage in California when compared on the basis of runoff per square mile. The average annual runoff of the Smith River is about 2.9 million acre-feet. This is the equivalent of 76 inches of runoff over the entire 720-square-mile drainage basin. Both the monthly and annual distribution of runoff are highly stable in comparison with other California basins, thus creating a fairly uniform flow. Flooding has occurred in the Smith River Basin, with the Christmas floods of 1955 and 1964 the worst in recent history. On December 22, 1964, five days of extremely heavy rainfall generated a flow of approximately 250,000 cubic feet per second in the lower Smith River at the Dr. Fine Bridge where the nondamaging carrying capacity is about 80,000 cubic feet per second.

The only long-term stream gaging station within the Smith River Basin is located on the left bank of the main river, one-half mile downstream from the mouth of the South Fork. Daily records are available at this location since October 1931. Synthetic monthly flows have been estimated back to October 1917 by correlation with runoff records from the South Fork Coquille River at Power, Oregon. The average monthly runoff at Smith River near Crescent City for the 50-year period 1917 through 1966 is given in Table 1. Stream gaging stations in the Smith River Basin are listed in Table 2.

Table 3 presents a summary of the mean annual runoff in the basin, starting at locations in the upper basin and proceeding downstream to the mouth of the Smith River.

The lowest recorded flow in the Smith River at the Crescent City gaging station from 1931 to 1968 is 160 cubic feet per second, which occurred on October 24 and 25, 1964. A flow-duration curve of Smith River flows compiled from 1932 to 1959 shows that a discharge of 200 cubic feet per second was equalled or exceeded 98.5 percent of the time.

The Smith River Plain provides most of the developed ground water within the study area. Yields are generally sufficient for domestic and

TABLE 1

AVERAGE MONTHLY RUNOFF AT THE SMITH RIVER NEAR CRESCENT CITY STREAM GAGE
(1916-17 through 1965-66)

Month	Average Runoff (acre-feet)	Average Flow (cubic feet per second)	Percent of Annual Runoff
October	73,000	1,200	3
November	252,000	4,200	10
December	423,000	6,800	16
January	485,000	7,800	19
February	407,000	7,000	16
March	362,000	5,800	14
April	276,000	4,600	10
May	171,000	2,800	6
June	74,000	1,200	3
July	31,000	500	1
August	20,000	300	1
September	19,000	300	1

Average annual runoff = 2,600,000 acre-feet.

TABLE 2

STREAM GAGING STATIONS WITHIN
THE SMITH RIVER BASIN

DWR Index No.	Name of Station	Drainage Area (sq. miles)	Period of Record
F-O-2100	North Fork Smith River at Gasquet	157	1911-16
F-O-3100	Middle Fork Smith River at Gasquet	130	1911-17 1958-65
F-O-4100	South Fork Smith River near Crescent City	291	1911-13 1954-61
F-O-1300	Smith River near Crescent City	609	1931-Present
F-O-1100	Rowdy Creek at Smith River	33	1957-62

TABLE 3

SUMMARY OF ESTIMATED MEAN ANNUAL RUNOFF
IN THE SMITH RIVER BASIN
(1916-17 through 1965-66)

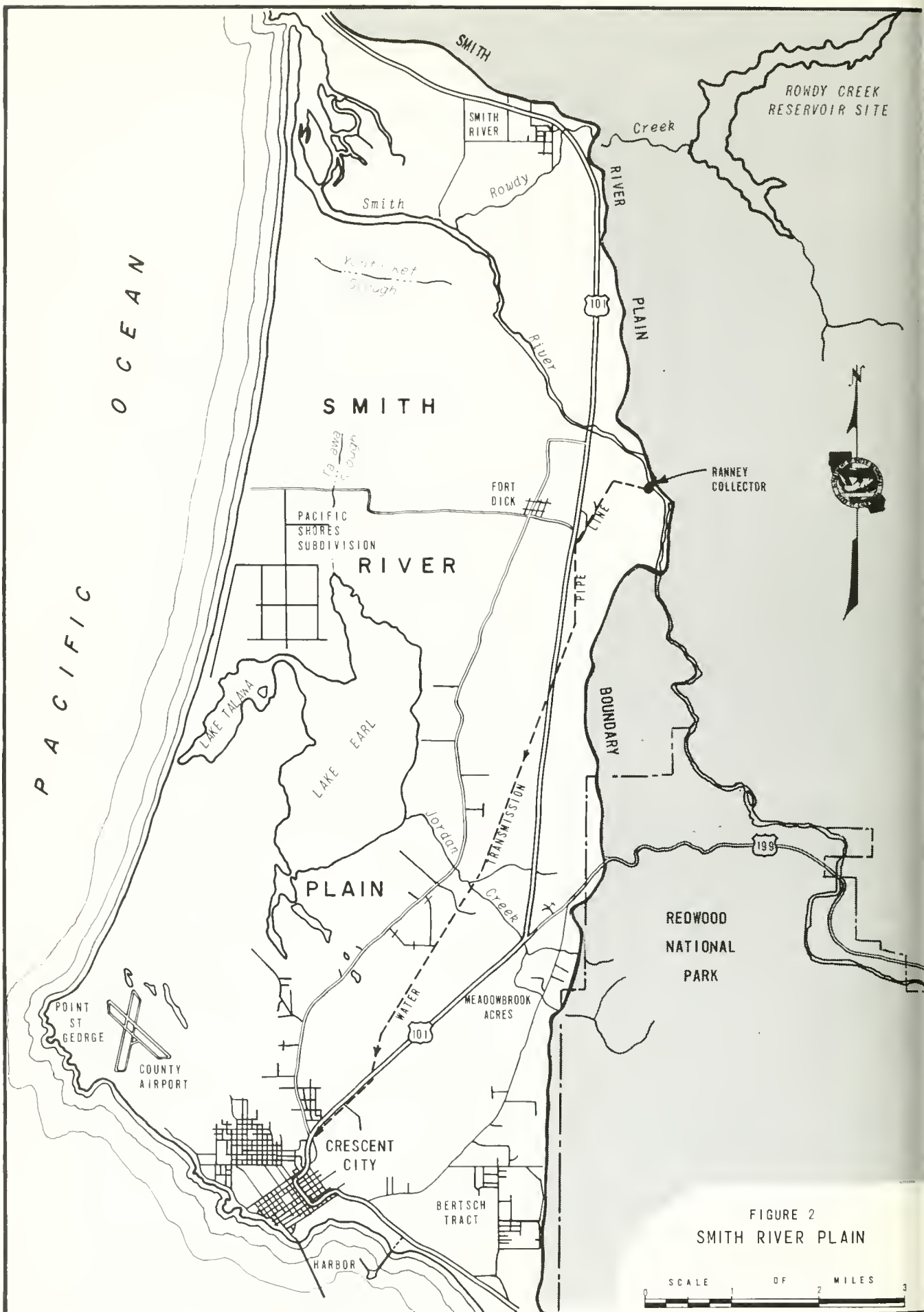
Stream	Drainage Area (sq. miles)	Mean Precipitation (inches)	Mean Annual Runoff (acre-feet)
North Fork Smith River at Gasquet	157	115	735,000
Middle Fork Smith River at Gasquet	130	97	470,000
South Fork Smith River near Crescent City	291	115	1,270,000
Smith River near Crescent City	609	111	2,600,000
Mill Creek at mouth	37	83	100,000
Rowdy Creek at Smith River	33	107	120,000
Smith River at mouth	720	108	2,900,000

irrigation uses, although there are several localized problem areas within the plain. The small river terraces such as Hiouchi, Gasquet, and Big Flat that lie next to the Smith River in the interior basin offer limited potential for ground water development.

In 1953 the U. S. Geological Survey estimated that the ground water basin within the Smith River Plain has a storage capacity of about 99,000 acre-feet between the depths of 10 and 35 feet. In a 1960 report entitled "Natural Resources of Northwestern California -- Plans of Water Development", the Bureau of Reclamation estimated a safe annual yield of approximately 39,000 acre-feet within the Smith River Plain. The safe yield at any specific location on the plain is dependent on the hydrologic and geologic characteristics of individual formations. The sand dunes and floodplains around the Smith River are permeable and readily replenished by infiltration of surface water while the terrace deposits are less permeable and the battery formations and alluvial fans are the least permeable and not as readily replenished.

With a few notable exceptions, the biological and chemical quality of ground water within the Smith Plain is suitable for most beneficial uses. This is primarily the result of adequate rainfall for ground water recharge and favorable seaward gradients which provide a flushing action within the aquifers. However, in the more heavily populated areas within the plain, cases of ground water pollution have been noted. Wastes produced by a growing population are increasing, and instances of water

quality impairment can be expected to increase significantly unless safeguards are taken. The proximity of shallow wells and sewage disposal sites in some parts of the Smith River Plain is a constant threat to ground water quality.



CHAPTER 3. WATER PROBLEMS IN THE STUDY AREA

In spite of the large amount of high quality, free-flowing water in the Smith River, there are water problems in the study area. Flooding is common along the lower Smith River and along the perimeter of Lake Earl. Ground water supplies are not always adequate and facilities are needed to deliver water to the population centers. This chapter presents existing and future water requirements in the area, identifies existing and potential future water shortages, discusses flooding in the basin, and includes a section on several problems associated with Lakes Earl and Talawa.

Water Requirements

The three major categories of land use within the study area are agricultural, urban, and forest. Our main concern is with agricultural and urban land use because of the water demand associated with them.

The Smith River floodplain and adjacent terrace lands comprise the principal agricultural areas of the Smith River Basin and Del Norte County. The first recognized agricultural land use in the Smith River Plain took place during the mid 1850s. The early agricultural interests centered around the production of food required by miners in their quest for gold. At this time the production of grain and fruit was prominent, but by 1880 dairying had become the chief activity.

The predominant use of land for nonirrigated livestock pasture established an agricultural pattern which remained relatively unchanged until the late 1940s. During the 1940s, two significant changes in the agricultural picture began to take place: the introduction of irrigation and the commercial production of bulbs and flowers. By 1949 there were 1,900 acres under irrigation in Del Norte County. This area increased to 3,500 acres in 1958 and 4,200 acres in 1968.

The 1968 irrigated acreage was separated into the following categories: pasture, 3,600 acres; bulbs, 400 acres; and alfalfa, 200 acres. During the 1950s, the bulb and flower industry expanded rapidly until the income from these products was equal to that of all the other agricultural activities even though these crops occupied less than 10 percent of the total cultivated area within the county.

The agricultural industry is the major water user in the Smith River Plain area. Approximately 6,500 acre-feet of irrigation water was required to irrigate crops located on the plain during the 1968 season. An estimated 65 percent of this irrigation water came from wells. The remaining 35 percent was surface water diverted from the Smith River and several creeks flowing through the area.

Crop projections made by the Department for the Smith River Plain indicate that 6,500 acres will be irrigated by 1990 with an applied water requirement of 10,000 acre-feet per year. By 2020, irrigated acreage is expected to increase to 8,000 acres with an applied water requirement of 12,500 acre-feet. No large increase in irrigated agriculture is expected in the upper Smith River Basin. Pasture will remain the major crop; however, truck, field, and alfalfa acreages are expected to increase greatly. The truck acreage will be comprised mainly of bulbs and potatoes. The commercial production of potatoes is a relatively new enterprise in this area. The 60 acres of potatoes grown here during the summer of 1968 were nonirrigated.

The first census, taken in 1860, showed Del Norte County to have approximately 2,000 settlers, most of whom had moved to the county after 1850. This number increased slowly through the 1920 census (2,560 residents) and then almost doubled within the next 10 years to more than 4,700. County population remained relatively static through the depression period. After World War II, the tremendously increased demand for timber and homes, together with improved transportation, spurred the population to 8,000 by 1950 and about 17,800 in 1960.

Because of the decline in forest products jobs over recent years, the 1970 population of Del Norte County has declined to about 14,300. However, this trend is expected to be reversed in future years because of such growth-producing factors as better highways, the National Redwood Park, improved air service, and the desire of many people to leave the overcrowded metropolitan areas. Del Norte County population is expected to be 23,000 in 1990 and 40,000 in 2020. Approximately 90 percent of these people will reside on the Smith River Plain. Of the four urban areas located within the study area -- Crescent City, Fort Dick, Smith River, and Gasquet -- only Gasquet is located outside the plain. Crescent City is by far the largest urban center in the study area with a population of over 3,500 persons living within the city limits and at least that many in the area immediately surrounding the city.

Smaller towns within the unit have developed more slowly. The post-World War II period has, with its general trend to suburbanization, seen a rapid expansion of scattered small residential communities. The planning and construction of new subdivisions between Crescent City and Fort Dick and around Lake Earl is progressing at a fairly rapid rate. The largest of these, Pacific Shores, is located on the north shore of Lakes Earl and Talawa and includes approximately 1,500 lots. Although the streets are constructed and all the lots are sold, no housing starts had taken place as of August 1970. Initial plans for an extremely large subdivision along the coast between the Smith River and the Del Norte County Airport have been announced. This development, known as Del Norte Dunes subdivision, has a planned capacity of 15,000 lots. Even though several subdivisions are now in the planning stage or under development, many years will pass before these areas will be more than partially occupied. Most of these lots have been purchased by out-of-area investors for speculation, retirement, or recreational homesites.

The estimated urban acreage within Del Norte County in 1970 is 6,000 acres, of which 4,800 acres are located on the Smith River Plain.

Urban land in the county is expected to increase to 6,500 acres by 1990 and to 8,000 acres by 2020. Future increases in urban acreage are expected to be largely confined to the Crescent City area. However, other areas that show a potential for development in the future include the area north and south of the Smith River between U. S. Highway 101 and the boundary of the Jedediah Smith Redwoods State Park. The area in and around the community of Gasquet is increasing in population and, with the improvement of U. S. Highway 199, should show a more rapid population growth in future years.

By definition, urban water use includes water for residential, commercial, industrial, municipal, military, and institutional uses. The term is applied in the sense that it is a kind of use rather than a place of use. Urban water use on the Smith River Plain, as shown in Table 4, is expected to increase from 2,000 acre-feet per year in 1970 to 3,000 acre-feet in 1990, and 5,000 acre-feet in 2020.

The major industrial water user in the study area is the lumber industry. Since 1950, the production of veneer plywood and remanufactured lumber products has accounted for an increasing percentage of the forest products income. In 1968 almost all lumber output was produced in the vicinities of Crescent City and the town of Smith River. Two fish processing plants were recently completed south of Citizens Dock. Prior to 1970, fish unloaded at the Crescent City Harbor were transported to Eureka for processing. These two new facilities supply additional income to the county economy and provide much needed employment during the winter months when timber harvesting is down.

Department of Water Resources' Bulletin No. 124, "Water Use by Manufacturing Industries in California 1957-1959", estimated the average annual industrial water use in the county during the study period at approximately 300 acre-feet. Future industrial water use in the Smith River Plain area is difficult to estimate because unforeseen new industries could locate in the area and because improved industrial practices often lead to more efficient use of water. At this time, industrial water use is not a major component of total water use, and future demands can probably be met by existing surface and ground water resources.

There has been recent speculation concerning the possible construction of a pulp mill in the Crescent City area. However, there appears to be little likelihood of this occurring. Large acreages of commercial timber in Del Norte County are presently cut by companies engaged in the manufacture of wood products and pulp in the Humboldt Bay area. Coarse wood residues from their lumbering operations in the Crescent City area are converted to wood chips and sent to Eureka for processing. The shipment of wood chips from Del Norte County to existing mills in the Humboldt Bay area and Oregon does not appear to leave enough raw material in the area to warrant the construction of an economically sized pulp mill.

Water-associated recreation is a vital part of the attraction which Del Norte County offers. Fishing, swimming, waterfowl hunting, and sightseeing are all activities which depend in large part on the continued abundance of water in the Smith River. Increasingly greater value is being

TABLE 4

EXISTING AND PROJECTED LAND USE AND WATER REQUIREMENTS
IN THE STUDY AREA AND DEL NORTE COUNTY

Area and Use	1970		1990		2020	
	Acres	A.F.	Acres	A.F.	Acres	A.F.
Smith River Plain (total)	8,800	8,500	11,500	13,000	14,500	17,500
Irrigated Agriculture	4,000	6,500	6,500	10,000	8,000	12,500
Urban	4,800	2,000	5,000	3,000	6,500	5,000
Upper Smith Basin (total)	400	300	500	650	800	1,200
Irrigated Agriculture	50	150	100	400	200	700
Urban	350	150	400	250	600	500
Del Norte County (total)*	10,500	9,500	13,500	14,500	17,000	20,500
Irrigated Agriculture	4,500	7,000	7,000	11,000	9,000	14,500
Urban	6,000	2,500	6,500	3,500	8,000	6,000

* The Winchuck River, Illinois River, and Lower Klamath Subunits are included in the Del Norte County total but are not part of the study area.

placed upon free-flowing streams of high quality water which traverse scenic regions. Outflow to the ocean can serve a very real purpose and may in effect be considered a nonconsumptive water requirement which is very important in preserving the recreation potential of the Smith River.

Water Shortages

A comparison of available water supplies (Chapter 2) with predicted future water requirements indicates that there should be no future water shortages in the Smith River area. Only about 20 percent of the potential capacity of Crescent City's water supply system is being used. Therefore, much of the future urban water requirements could be met through the existing Crescent City diversion from the Smith River. This system, with expansion of distribution lines and limited modification, could serve the domestic needs of Crescent City and the surrounding locality for many years. Other outlying subdivisions and small communities on the Smith River Plain could be served by ground water, local creeks, or additional diversions from the Smith River.

While it is true that total water supplies are more than adequate to meet future water projections, many future problems will arise regarding distribution of available water to areas of use. In some cases, water quality considerations may dictate a change from individual wells to the use of other supplies such as stream diversions and community water systems.

Within the Smith River Basin study area, the quality of domestic water supplies ranges from excellent, as in the case of the Crescent City municipal system, to extremely poor in some outlying areas which rely entirely on ground water drawn from shallow wells. In many instances these wells were excavated by hand and are not properly sealed or cased near the surface. Surveys conducted by the Department in 1955 and 1961 revealed the following well conditions on the Smith River Plain. The median depth of all wells included in two surveys was 27 feet, and 42 percent of these wells were constructed by hand methods. Almost half the surveyed wells had metal casings; however, 22 percent had either no casing or were wood-lined. Twenty-two percent were subject to flooding and 20 percent indicated drainage to be toward the well. No surface seal was provided around 76 percent of the wells.

Within Del Norte County a large portion of the population is dependent upon both individual household water supply and sewage disposal systems. The proximity of shallow wells to sewage disposal sites creates a constant threat of impairment and contamination of ground water. The results of tests in the Smith River Plain indicate that bacterial impairment of ground water has occurred in some areas, and that such impairment is greatest in heavily populated areas and in waters nearest the ground surface.

The Bertsch Tract

The Bertsch Tract, located 2-1/2 miles southeast of Crescent City, is an area of chronic water problems which are the most severe in the county. This area is supplied by individual wells ranging from shallow dug wells to drilled wells up to 64 feet deep. Ground water is supplied from the Battery Formation, which underlies the southern half of the Smith River Plain.

Within the tract, the upper portion of the Battery Formation consists mainly of a tight red sandy clay extending to depths of 20 to 30 feet. In the lower portion of the Battery Formation, to depths of 40 or 50 feet, are layers of mixed sand and gravel which appear to be extensive throughout the tract. This lower gravelly zone is probably at the base of the Battery Formation. It is unlikely that large water supplies could be found by drilling deeper since the St. George Formation, consisting of nonwater-bearing shale, is believed to underlie the lower gravels of the Battery Formation. Poor yields are typical of wells in the Battery Formation throughout the Smith River Plain. Shallow dug wells obtain water from the low-yielding, fine-grained material in the upper portion of the Battery Formation. These wells frequently go dry in the summer and are susceptible to contamination since sewage is disposed of through septic tanks and cesspools. Some wells of intermediate depth obtain an adequate supply from black sands, and most wells over 30 feet deep obtain an adequate supply from the basal gravelly aquifer system. Although the deeper

wells provide an adequate supply for a family unit, the yields are small. Apparently the lower gravel beds are a sandy or clayey gravel having low permeability. Well yields reported on some of the well logs available do not exceed 25 gallons per minute.

Annual recharge to the formation is estimated to be low. Since the upper layers of the Battery Formation are quite low in permeability, infiltration of precipitation is slow. Recharge from small streams entering from the east appears to be negligible. A high iron content in the water is reported from owners of both deep and shallow wells. In many cases water from both deep and shallow wells is reported to be unfit to drink.

A community well or a group of wells in the Battery Formation in this tract appears to be an unlikely possibility in view of the low recharge potential, low well yields, and high iron concentrations. Although the area near LeClair Avenue is reported to have a fair supply of iron-free water, it is an unproven and probably inadequate source for developing quantities of water large enough to supply the community.

A survey of water problems in the Bertsch Tract was conducted in the summer of 1969. In this survey 60 residents were asked questions concerning their well systems. The survey revealed that approximately 25 percent of the people interviewed considered their water supplies inadequate, and 55 percent were in favor of a community water system. Along with the survey approximately 30 wells were tested for domestic wastes contamination. A majority of the wells tested showed excessive iron concentrations that exceeded the 0.3 ppm recommended by the U. S. Public Health Service.

High iron concentrations are not physically harmful, but are a nuisance. Iron-laden water tastes bad, stains clothing and plumbing fixtures, and deposits a residue in pipes. Little chemical evidence of contamination was found in the Bertsch Tract well water, but several hepatitis cases have been reported in this area. Contaminated drinking water is one carrier of this infection.

The most serious water problems are found in the southwest Bertsch Tract area along Roy, Quinlan, and Darby Streets where many people refuse to drink well water and resort to bottled water. The water problems of this area include insufficient yields, extremely high iron concentrations, some contamination of shallow wells, and cases of sewage effluent seeping into open drainage ditches.

On May 21, 1970, an election was held to form a community services district which would encompass the Bertsch Tract and surrounding area. Eighty-six percent of the voters approved the formation of the district.

Pacific Shores Subdivision

The trend toward concentrated urban development around Lake Earl has caused some concern over the possibility of degrading the water quality of the lake with wastes from septic systems. The new Pacific Shores subdivision with approximately 1,500 lots located north of Lakes Earl and

Talawa relies upon individual wells and septic systems. From available geologic information this area appears to be underlain mainly by old stabilized sand dunes 20 to 30 feet thick. Below this probably lies the nonwater-bearing shale strata of the St. George Formation. Despite the thinness of the sand deposits, a large quantity of water can be yielded by the infiltration of precipitation which averages 70 inches in this area.

Only one well has been constructed recently at Pacific Shores. This well was drilled 26 feet to the shale layer and produces 20 gallons per minute of good quality water. Numerous individual wells could supply the tract from the large volume of water in storage which is replenished by infiltrated precipitation. However, wells near Lake Earl and along the ocean could draw in brackish or sea water if overpumped, particularly during any protracted dry spells.

Septic tank effluent from numerous individual systems would tend to pollute and contaminate the upper sand aquifer. Therefore, wells should be sealed in their upper portions and water extracted from near sea level. The sand dune material provides an ideal filter, and the travel of bacteria would probably be limited to approximately 100 feet. Therefore, wells should be located at least 100 feet away from the nearest septic tank leach line.

Under the conditions of full housing development, chemical pollutants that are not removed by the filtering action of the sand could eventually degrade the ground water supply. It could become necessary at some time in the future to provide a new source of domestic water, possibly from the Smith River. The probable effect of a high concentration of homes and wells in this subdivision is more a problem of eventual water quality deterioration than a lack of sufficient water quantity. Because of the high amount of rainfall infiltration, flushing action may keep this problem minimal.

Protection against future impairment of the ground water resources can be provided by the adoption of minimum county standards for the construction and sealing of wells. Department Bulletins No. 74 and No. 74-3 outline the necessary standards within Del Norte County.

Flooding

The Smith River Basin is typical of most uncontrolled North Coastal drainages in its susceptibility to periodic flooding on a large scale. Major floods occurred in the Smith River Basin during December 1955 and December 1964. The 1964 flood exceeded in magnitude all previous floods of record. During heavy floods, the North Coast characteristically sustains great damage in relation to its total economy. The reasons for relatively severe damage within the Smith River Basin are related to the following factors: (1) annual precipitation in the Smith River Basin is the heaviest in the State; (2) the topography of the area is steep and the early winter snowpack is minimal, resulting in rapid runoff; (3) development tends to occur in flats next to the river and the delta area, both of which were

formed by periodic flooding; and (4) there are no existing flood control projects within the basin other than a few private levees.

Damages in the Smith River Basin during the 1964 flood amounted to approximately \$12,200,000. The two largest segments of this damage were washed-out roads and bridges and flooded agricultural lands. Fortunately, there was no loss of human life within the Smith River Basin during this flood. Measured precipitation in the basin during the 9-day period from December 19 to 27, 1964, ranged from 19 inches at Crescent City to 34 inches at the Idlewild Highway Maintenance Station. The total runoff of the Smith River at the stream gaging station near Crescent City during this period was 862,000 acre-feet, which is equivalent to 26.5 inches of water distributed uniformly over the entire Smith River Basin. The peak discharge on December 22 was estimated to be about 228,000 cubic feet per second where the Smith River near Crescent City gage washed out and 250,000 cubic feet per second at the Dr. Fine Bridge.

During this flood period, Smith River waters flowed through Talawa Slough into Lake Earl, which rose about 5 feet and discharged through Lake Talawa into the ocean. Approximately 9,300 acres of pasture and other agricultural lands were flooded in the delta and in the region surrounding Lake Earl.

Large slides occurred throughout the Smith River Basin in December 1964. The greatest of these covered over 40 acres in the South Siskiyou Fork Smith River Basin. As a result of the slides, observers at downstream points along the Middle Fork Smith River reported sudden increases in river stages, which were often preceded by an increased sediment load in the floodwaters.

On January 24, 1970, after several days of heavy rainfall, a large slide cascaded down Little Rattlesnake Mountain and into the South Fork Smith River, temporarily blocking the flow. The volume of this slide was between 1-1/2 and 2 million cubic yards. Approximately 5 minutes after the blockage, the river had ponded and breached the slide, causing a surge in downstream river flows. Although no damage was caused by this wave of water, future avalanches are expected in the South Fork Smith River Basin which could impound larger quantities of water. In light of this possibility it would seem prudent to closely monitor data from the stream gaging station located below the South Fork Smith River. Readings from this gage might be the only warning that water was ponding somewhere in the upper basin and creating a condition which could produce a damaging wave.

A detailed investigation of Smith River flood control projects was beyond the scope and purpose of this study. However, the U. S. Army Corps of Engineers has recently completed studies of potential flood control projects in the Smith River Basin, including levees, dams, and floodplain information studies for possible future zoning use. Their report concludes that a need exists for some type of flood control program in the Smith River Basin, but that structural measures such as levees, channel improvements, or dams cannot be economically justified at this time. Flood damage reductions can best be achieved through better management and controlled development in the floodplain. The Department of Water Resources is in agreement with the conclusions for the following reasons. Neither

the topography nor the geology of the region favor the construction of large dams at reasonable cost. Moreover, the present benefits to be realized from a flood control project in the Smith River Basin are not sufficient to justify the relatively high costs. Also, inundation of irreplaceable redwood forest land and scenic stretches of high quality recreation areas along the Smith River makes the construction of a dam of adequate size and location to provide substantial flood control undesirable.

Without levees or reservoirs, floodplain management appears to be the best method of reducing future flood damages. Floodplain management can take the form of zoning, building codes, and subdivision regulations designed to limit development in areas subject to flooding.

The Corps of Engineers has recently completed a floodplain information report on the land surrounding Lakes Earl and Talawa. The report delineates areas subject to flooding under historical floods as well as under hypothetical regional floods. This type of report is essential in the development of sound floodplain ordinances. A similar type of study should be requested by county officials for the lower Smith River area.

Lakes Earl and Talawa

Together, Lakes Earl and Talawa form a moderate-size body of shallow water lying near the geographic center of the Smith River Plain, as shown in Figure 2. Lake Talawa, the smaller of the two, lies directly west of Lake Earl, to which it is connected by a narrow neck of water which averages about 400 feet in width. The lakes usually cover an area of about 2,200 acres at an elevation of 4 feet; however, during periods of flooding the level of the lakes can rise to an elevation of about 10 feet, at which height they cover an area of about 4,200 acres.

The riverbed of the Smith River at one time passed through Lakes Earl and Talawa to the sea. When geophysical changes shifted the mouth of the Smith River to the north, these lakes remained. The old channel from Yontocket Slough to Talawa Slough is still capable of carrying floodwaters from the Smith River into the lakes, as happened in December 1964. This condition offers the most serious threat to present and future improvements.

Between Lake Talawa and the Pacific Ocean, a sandbar is formed by ocean wave action. This is the natural outlet of the lakes to the sea, and periodically, when the water level in the lakes rises, the sandbar will breach, allowing the lakes to partially drain. Many times the water level will rise, but not high enough to breach the sandbar. The Del Norte County Flood Control District then must mechanically breach the sandbar with a bulldozer in order to alleviate the flooding of agricultural land surrounding the lakes. This somewhat hazardous operation has been required from three to six times a year.

There are several other problems connected with Lakes Earl and Talawa. Practical solutions are difficult to formulate because basic data

are lacking and because solutions are very costly in comparison to the benefits derived. Probably the most perplexing problem, which directly affects all others, is the question of lake bottom ownership. A quiet title suit has been brought against the State of California by a landowner seeking to establish his ownership of the entire lake bottom. This lawsuit has been pending for several years, and neither party is ready to bring it to court. There is little reason to believe that the question will be settled in the near future. This situation prevents expenditure of public funds for lake improvements, such as assured public access or construction of a boat ramp. Public access is now allowed by private landowners at three locations; but, with the entire lake surrounded by private land, this situation is subject to change at the will of the owners.

Ground water levels appear to be closely related to the level of the lakes. When the lakes are low during late summer and fall, some of the surrounding irrigation wells go dry. When the water level in the lakes is high, wells and septic systems are subject to inundation and a potential public health and sanitation problem occurs. Because of the very gentle shoreline slopes and constant fluctuation of the surface level, standing water collects in many local depressions, thereby contributing to mosquito breeding problems.

Seemingly, most of these problems could be solved by stabilizing the lake level at some predetermined elevation. A study would be required to determine the most favorable elevation and to appraise the effects of lake level stabilization. Opinions of surrounding landowners differ on the most desirable lake level. Some owners favor a relatively high lake level for increased recreational use and others favor a low level for increased availability of agricultural land. Even if the level of stabilization could be determined and agreed upon, past studies indicate that the costs of stabilization could exceed the benefits.

The trend toward concentrated urban development around Lake Earl could have an adverse effect upon future water quality. The Pacific Shores subdivision located immediately north of Lakes Earl and Talawa will use individual wells and septic systems. The sandy and pervious nature of the soil in this subdivision is cause for some concern over the effect a heavy concentration of individual septic systems will have on the quality of ground water and water in the lakes.

Preliminary studies of the Lakes Earl and Talawa problem have been conducted in the past by various government agencies, including the Department of Water Resources, the University of California Agricultural Extension Service, the California Department of Fish and Game, and the California Department of Public Health. In August 1962, a public hearing on Lake Earl was conducted in Crescent City by a subcommittee of the Assembly Interim Committee on Ways and Means. This subcommittee was formed to obtain facts pertinent to Lake Earl problems and to determine the need for a legislative program to deal with these problems. The recommendation of this subcommittee, as a result of the hearing, was that authorization of further state-financed studies of Lake Earl should not be made until the individual state agencies involved find such studies necessary and after the following qualifications are met:

1. The legal position of landowners with holdings around the lake be clarified and the legal status of the body of the lake fully determined.

2. A greater unanimity of opinion be obtained among the people who would be most directly affected by any changes in the lake and its use.

3. Existing alternative sources of revenue to finance the studies, including utilization of local resources, be fully investigated and exhausted.

Little has happened to change conditions existing when these recommendations were made. A network of streets has been constructed at Pacific Shores subdivision, but no housing starts had been made as of August 1970. The question of lake bottom ownership has not been settled and therefore it is possible that private recreational development of the lakes with restricted access could occur. Very little additional basic data concerning the relationship between rainfall, lake level, and surrounding ground water level have been gained. Therefore, until the questions concerning lake bottom ownership and the desirability of lake level stabilization are settled or until Lake Earl poses a more serious problem than it has in the past, it will be difficult to justify extensive study by the Department of Water Resources or other state agencies.



SWIMMING IN THE SMITH RIVER



PIER FISHING AT CRESCENT CITY HARBOR



FAMILY RECREATION AT PEBBLE BEACH

CHAPTER 4. WATER PROJECT DEVELOPMENT

Historically, the Smith River Basin and Crescent City area has grown slowly in comparison to California as a whole. As a result, most water development within the study area has been on a small scale. In this report, consideration has been given to the possible need for water development which could provide water conservation, flood control, or recreation benefits. This chapter describes past water planning and discusses the potential future water developments which were studied during this investigation.

Existing Development

Water development in the Smith River Basin and Plain is limited to relatively small-scale diversions of surface water and the pumping of ground water from privately owned wells on individual lots or farms. There are no water storage projects in the study area and only the towns of Crescent City, Smith River, and Gasquet have community water systems. Meadowbrook Acres will begin using water from the Crescent City pipeline in late 1970.

Crescent City is served by direct diversion of water from the Smith River. The Crescent City Municipal Water District owns and operates a Ranney Collector and transmission pipeline which deliver water from the Smith River to the city's distribution system. This diversion system with modification could deliver about 12 million gallons per day to the city. The Smith River and Gasquet systems are privately owned and are inadequate for fire protection or for future water needs.

Past Planning

The California Water Plan, as initially presented in Bulletin No. 3 and expanded upon in Bulletin No. 136, is a master plan to guide the State in the efficient and timely development of our water resources. The plan includes projects to meet local needs, as well as a system of major works to redistribute excess waters from areas of surplus to areas of deficiency throughout the State. The plan is flexible. It is subject to periodic reevaluation and modification by continuing studies and the will of the people as expressed through the legislative process.

Bulletin No. 3, "The California Water Plan", mentioned three projects in the Smith River Basin for potential future development. Rowdy Creek Dam and Reservoir was suggested as a local project which could provide a supplemental yield to the Smith River Plain, if ground and surface water development proved insufficient to meet future demands. Canthook and Blackhawk Reservoirs on the South Fork Smith River were presented as

a means of conserving and diverting surplus flows to the Klamath River for eventual transport to the Sacramento River Basin and beyond for use in water-deficient areas of the State. However, large-scale future development on the South Fork Smith River appears questionable for several reasons. First, the geology of the South Fork from Big Flat to the forks of the Smith River near Hiouchi is very unstable as demonstrated by numerous landslides. Second, the economic justification of a large flood control and water transport project in the South Fork Basin is doubtful. Finally, a large water project in the Smith River Basin would block great numbers of anadromous fish from upstream spawning areas and would have an adverse effect on the natural beauty of the Smith River.

Bulletin No. 136, "North Coastal Area Investigation", was a reconnaissance-level study which built upon Bulletin No. 3 and identified the upper Eel River Basin as the location for the initial North Coastal facility of the State Water Project. Concerning the Smith River Basin, Bulletin No. 136 makes the following statement: "The basin offers a potential future water supply; however, it is situated so far from water-deficient areas that no plans have been formulated in this investigation for developing its water resources."

Projects Studied During this Investigation

It became apparent during the course of this investigation that most of the future growth in local water requirements could be met by direct diversions from the Smith River or increased ground water pumping without building sizable on-stream storage facilities. Several large upper basin storage projects were considered in the initial phases of this study but were rejected for continued study because it did not appear possible to justify them. The natural beauty of the Smith River, its fish and wildlife, and its ability to clear in a short period after high water made it desirable to seek water supply alternatives other than a large dam on the main stem. Consequently, considerable attention was given to studying the potential of direct diversion from the Smith River and to the study of a smaller storage project off the main Smith River. Rowdy Creek was chosen as a suitable site for a small storage project because of its location, topography, and streamflow. The construction of a dam and reservoir on Rowdy Creek would leave the main stem of the Smith River unblocked and in a relatively natural state. The following sections present the results of these studies.

Smith River Diversions

The Smith River in the plain area near its mouth is presently the source of several irrigation and domestic water supply diversions. More than 50 percent of the water presently used in the Smith River Basin and Plain is diverted from surface runoff of the Smith River or other small streams. Even so, the total surface water diverted is an extremely small fraction of the total runoff of the study area. The largest Smith River diversion is made by Crescent City. The city now diverts maximum

flows of approximately 3 cubic feet per second and has filed for appropriate water rights to 9.8 cubic feet per second. This leaves a potential surplus capacity of approximately 7 cubic feet per second that could be used by the populated areas surrounding Crescent City which are in need of improved water supplies. A recent example of this type of expansion is the Meadowbrook Acres area near the intersection of U. S. Highways 101 and 199. Construction will be completed in November 1970 on a water system which will serve 56 residences initially and use the Crescent City transmission line as its source of water. More than one-half of all Del Norte County residents live within a 3-mile radius of Crescent City and could be served from this transmission system.

The lowest recorded flow of the Smith River at the gaging station near Crescent City is 160 cubic feet per second. A flow-duration curve of daily runoff at this station from 1932 through 1959 shows that a flow of 200 cubic feet per second was equaled or exceeded 98.5 percent of the time. There is a potential for increased diversion of these high sustained summer flows. Probably the most important factors to be considered when planning for additional diversion from the Smith River are the preservation of anadromous fish and protection of the general scenic-recreational opportunities along the river.

The California Department of Fish and Game has made several recommendations to the Department of Water Resources concerning increased diversion of flows from the Smith River. These recommendations are summarized as follows:

1. Future water diversion facilities on the Smith River should be similar to the infiltration well now operated by Crescent City.
2. Natural low flows of the Smith River in the plain area near its mouth should not be depleted by more than 50 cubic feet per second, including the 9.8 cubic feet per second applied for by Crescent City.
3. If the diversion causes the river mouth to close because of sandbar formation during low flows, an opening should be maintained mechanically at project cost.

In summary, the Department of Fish and Game states that with proper planning, increased diversion of Smith River water for local needs should not create serious problems for anadromous fish.

The Rowdy Creek Project

Increased ground water pumping and the direct diversion of water from the Smith River have the potential to satisfy large increases in water requirements in the study area. However, a reservoir development could be used to meet future water requirements if they greatly exceed our present projections. While a reservoir situated off the main stem of the Smith River would have very little potential for reducing flood damages in the

study area, it would leave the Smith River unobstructed for anadromous fish migrations and would not impair the natural beauty of the river.

Rowdy Creek, which flows into the Smith River from the north at a point about 4 miles upstream from where the Smith River enters the Pacific Ocean, would provide an ideal location for a reservoir development. A reservoir on Rowdy Creek would be well situated to: (1) provide water to the Smith River Plain and the communities located there, (2) provide a desirable recreation development, and (3) cause a minimum of alteration of the natural values of the Smith River.

The project studied during this investigation was a dam on Rowdy Creek located about 4 miles upstream from the Smith River in Section 30, T18N, R1E, HB&M. A 180-foot-high dam at this site would impound 41,000 acre-feet of storage and provide a water surface area of 530 acres when full. A reservoir of this capacity, which appears to be about the optimum size from a hydrologic standpoint, would be capable of supplying 30,000 acre-feet of water per year to users on the Smith River Plain. If adequate recreation facilities were provided, the reservoir could attract and support 60,000 visitor-days initially and 120,000 visitor-days per year at full development. The project has very little potential for preventing flood damages and consequently no specific flood storage reservation was included during project analysis.

A preliminary design and cost estimate prepared for this report indicates that this project would cost about \$19 million -- \$12 million for the dam and reservoir and \$7 million for recreation facilities and fish and wildlife mitigation features. Recreation benefits would justify a portion of this cost, about \$3,500,000. The rest of the cost would have to be borne by water users. Unless a large industrial water demand develops on the Smith River Plain, this project will probably not be economically justified in the foreseeable future.

The Rowdy Creek drainage above the reservoir covers an area of 27 square miles and is located northeast of the town of Smith River. The watershed has been logged and most of the timber now standing is between 40 and 50 years old. The average annual rainfall of 107 inches within the basin results in a runoff of approximately 104,000 acre-feet per year at the damsite. The stream supports sizable numbers of trout, steelhead, and salmon while the riparian valley land provides favorable habitat for deer, beaver, rabbits, quail, and other desirable wildlife.

The impact of a Rowdy Creek Dam on fish and wildlife would be significant. The Department of Fish and Game estimates that approximately 1,500* king and silver salmon and 1,500* steelhead trout spawn in Rowdy Creek annually. A large percentage of this run would be blocked from its spawning areas by the dam. Facilities such as a hatchery or spawning channel capable of mitigating for this loss must be provided at project

*Taken from Department of Water Resources' Bulletin No. 136, Appendix C, "Fish and Wildlife".

expense. In addition, most species of wildlife in the project area are dependent at least part of the year upon the open valley meadows and riparian vegetation along Rowdy Creek. Relatively isolated valley environment is scarce in the mountainous North Coast region and the inundation of this type of habitat would create wildlife losses that would be difficult to offset. During any future studies of the Rowdy Creek Project, increased attention should be devoted to the study of both onsite and off-site mitigation for wildlife losses. Office reports covering the topics of geology, design, recreation, and fish and wildlife of the Rowdy Creek Project are on file with the Northern District of the Department of Water Resources.

Until water demands greatly exceed those currently projected for the Smith River Plain area, further consideration of the Rowdy Creek Project is not warranted. Increased diversion from the Smith River is a more suitable and cheaper source of future water supplies than Rowdy Creek and fewer fish and wildlife problems would be encountered.

Future Developments

There are many state and federal programs that could be used to aid in developing and protecting the water resources of the Smith River. The following sections describe two state programs that could play a major role in future developments in the Smith River and Crescent City area.

Davis-Grunsky Act

In 1957, the California Legislature declared that it is state policy to provide financial assistance to public agencies for the construction of local water projects in which there is statewide interest. Through a series of legislative amendments and the passage of the Burns-Porter Act in 1960, this policy assumed its present form and became known as the Davis-Grunsky Act. Bond money in the amount of \$130 million was authorized to finance the program. The Davis-Grunsky Act is administered by the Department of Water Resources and the California Water Commission.

The broad objective of the Davis-Grunsky Act is to further local development of California's water resources. Specifically, the program provides financial assistance to public agencies that are unable to obtain other financing for the planning and construction of local water projects. The Act also provides loans for preparation of project feasibility reports.

At present there are six agencies in Del Norte County which have filed for state financial assistance under the Davis-Grunsky Act. The first area to apply was the Klamath Community Services District which needed financial help in constructing a water supply and distribution system for the relocated townsite of Klamath. The December 1964 flood completely destroyed the original townsite of approximately 250 people. In a coordinated effort between all levels of government, the town has since been relocated on higher ground. The Department's role in this effort was the granting of a \$68,000 Davis-Grunsky loan to match a federal grant for the purpose of providing a municipal water system to Klamath.

Subzone W-1 of the Del Norte County Flood Control District (Meadowbrook Acres) was formed to furnish domestic water to a subdivision of approximately 130 people. Individual wells in the area are of low yield and some are possibly contaminated by septic tank effluent. Residents and county officials agreed that the development of a new water supply for the community would be highly desirable. Unable to obtain financing elsewhere, the District submitted a loan application under the Davis-Grunsky Act for construction of a complete water distribution system. A loan in the amount of \$111,000 was approved. Construction of the system was completed during the summer of 1970. Water will be purchased from the Crescent City Municipal Water System and will be provided by a turnout from the existing pipeline running between the Smith River and Crescent City.

Approval of a \$253,000 loan to the Gasquet Community Services District was given by the California Water Commission in November 1969. This small inland resort community is located along U. S. Highway 199 approximately 15 miles northwest of Crescent City. An inadequate existing water system cannot supply sufficient water to meet present and projected needs and offers little fire protection.

The Big Rock Community Services District, located near the entrance to Jedediah Smith State Park, has submitted a Davis-Grunsky construction loan application for a community water system. This application is presently being reviewed by the Department of Water Resources. The Department will file a report of its findings with the California Water Commission which must give final approval for the loan.

Two areas which have recently filed applications with the Department in order to learn if they meet the basic conditions of eligibility under the Davis-Grunsky Act are the Bertsch-Ocean View Community Services District and the Smith River Community Services District.

The Protected Waterways Act

In August 1968, the Governor signed into law the California Protected Waterways Act, which provides for a study of the State's waterways in relation to their recreational uses. This Act declares that it is state policy to conserve those waterways of the State possessed of extraordinary scenic, fishery, wildlife, or outdoor recreation values. The Resources Agency is requested to develop the initial elements of a protected waterways plan which will consider the following objectives.

1. Identification of "extraordinary" waterways in California.
2. Identification of the public interest and demand for the resources of "extraordinary" waterways.
3. Identification of activities and conditions which diminish the resources of such waterways.

4. Proposal of standards, requirements, and administrative or legislative actions which would protect such waterways, yet permit development and management of other resources where compatible.

5. Determination of waterways that merit priority action due to the nature of their resources, level of use, or imminent threats.

The initial elements of the protected waterways plan will be sent to the Legislature in early 1971. At the present stage of planning, specific recommendations as to what degree of protection or what standards, requirements, and controls will be necessary to implement the plan have not been formulated. These recommendations will vary from stream to stream. As management plans are developed for individual waterways, public hearings will be held.

The Smith River Basin in its present state of development offers several of the primary elements mentioned in the California Protected Waterways Act. It is a scenic region relatively undisturbed by man's activity, in which thrive large numbers of fish and wildlife. The Basin's clear water, unpolluted air, and relative isolation from crowded urban areas is attracting increasing numbers of recreationists each year. Protection of these existing characteristics of the Smith River Basin is vital to the future of recreation in the area.



SMITH RIVER AT JEDEDIAH SMITH STATE PARK

CHAPTER 5. CONCLUSIONS AND RECOMMENDATIONS

The Smith River Basin and Crescent City Plain area is rich in natural resources, including water, timber, scenic beauty, fish, and wildlife. The orderly development and conservation of these resources is essential to the future of the area and its people.

All the area's present water requirements are met from ground water pumping and direct diversion of unregulated streamflow. The largest potential source of surface water is the Smith River. Ground water pumping and direct diversion from the Smith River have the potential to meet most of the area's projected future water requirements.

Recreation, centered around the Redwood National Park, the Smith River, and the Pacific Coast, will play an ever-increasing role in the overall economy of this area. Consequently, the preservation of the waters of the Smith River in a natural and healthy state should be adequately considered in any overall plan for the development of this area.

Within this broad framework, these specific conclusions and recommendations have been formulated.

Conclusions

1. The projected water demand of the study area in 2020 is estimated at 13,200 acre-feet per year for agriculture and 5,500 acre-feet per year for urban uses. The potential for increased use of ground and surface water supplies within the study area is sufficient to meet this projected demand. The safe annual yield of the Smith River Plain ground water basin is approximately 39,000 acre-feet per year. Additionally, about 36,000 acre-feet of water per year on a uniform monthly flow basis can be diverted from the lower Smith River without constructing storage reservoirs. This would still allow flows recommended by the Department of Fish and Game to continue to the ocean.

2. The Rowdy Creek Dam and Reservoir is presently not economically justified. If future water or recreation demands tend to greatly exceed present projections, a reevaluation of the project may be warranted at that time.

3. The Bertsch Tract and surrounding area has experienced serious ground water problems, such as low well yields, high iron content, bad taste, and sewage contamination. The best way to provide an adequate source of high quality domestic water to the area is by the construction of a pipeline and distribution system into the area from the Crescent City water system.

4. Existing and proposed subdivision development around Lakes Earl and Talawa could eventually pose a water quality threat to the lakes and ground water, if individual septic systems are used for sewage disposal. The probable effect of a high concentration of wells and septic systems in the Pacific Shores subdivision will be a gradual deterioration of water quality from chemical wastes not filtered out by the aquifer.

5. The Smith River Basin, including Lakes Earl and Talawa, is subject to periodic flooding which does considerable damage to roads, bridges, and agricultural land. Urban encroachment onto floodplain lands would increase the damages of these floods tremendously. Recent studies by the Corps of Engineers and the Department show that levees and reservoirs are not economically justified at this time. Floodplain management appears to be the best means of reducing the damages of future floods.

6. The Smith River is an extraordinary waterway in scenic beauty, water quality, and fishery resources, and is deserving of study for possible inclusion under the California Protected Waterways Act. The development and implementation of a balanced land use plan would serve to protect these values.

Recommendations

1. The extension of the Crescent City domestic water supply system, to areas of need outside the city limits, should be encouraged.

2. Adequate water well construction and sealing standards as recommended in Department of Water Resources' Bulletins No. 74 and No. 74-3 should be adopted and enforced for the protection of ground water quality in Del Norte County.

3. As construction of homes along the shores of Lakes Earl and Talawa increases, periodic water quality tests should be conducted to determine if effluent from septic systems is reaching the lake or the underlying ground water basin.

4. Del Norte County should formulate and adopt a balanced land use plan which provides for orderly future growth and protects the extraordinary qualities of the Smith River and its watershed. All levels of government should make a concerted effort to preserve the scenic beauty, excellent water quality, and abundant fish life of the Smith River waterway.

5. Del Norte County should request further assistance of the U. S. Army Corps of Engineers in developing a floodplain management program for the Smith River, including Lakes Earl and Talawa.

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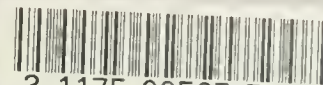
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